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ABSTRACT

Children and adults participated in a series of experiments to examine certain cues to surface constituency that are salient to children in the recognition of syntactic structure. Cue recognition was studied through a set of experiments requiring seven-year-old children to repeat certain syntactic constituents. It was found that the children could identify subject and predicate phrases with great accuracy, but that their performance appeared to depend on prosodic cues, as indicated by their poorer success in identifying single pronoun subjects and subjects of sentences with misleading intonation contours. The experiments suggested that duration (phrase-final lengthening) was important in children's recognition of structure and that children might be more heavily dependent on prosodic signals of syntactic structure than adults. In addition, the experiments suggested that children's reliance on prosodic cues might relate to the difficulty many beginning readers have in comprehending what they read, even when they know the individual words in a written sentence, since prosodic cues are not systematically preserved in written language. (An appendix contains lists of sentences used in the experiments.) (Author/FL)

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Technical Report No. 527

(Revision of Technical Report No. 466)

WHY SHORT SUBJECTS ARE HARDER TO FIND THAN LONG ONES

by

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Report from the Project on
Studies in Language: Reading and Communication

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Abstract

This paper, a revised version of Technical Report No. 466, examines certain cues to surface constituency that are salient to children in the recognition of syntactic structure. Recognition is studied through a set of experiments requiring seven-year-old children to repeat certain syntactic constituents. These children can correctly identify subject and predicate phrases with surprising accuracy, but their performance appears to depend heavily on prosodic cues, as indicated by the poorer success of children in identifying single pronoun subjects and subjects of sentences with misleading intonation contours. It is argued that duration (phrase-final lengthening) is especially important in children's recognition of structure and that children may be more heavily dependent on prosodic signals of syntactic structure than are adults. Finally, it is suggested that children's reliance on prosodic cues may relate to the difficulty that many beginning readers have in comprehending what they read (even when they can identify the individual words in a written sentence) since prosodic cues are not systematically preserved in written language.

There is every reason to believe that an essential component of language acquisition is learning to recognize the surface phrase structure of sentences. Such a surface "parsing" appears to be necessary in comprehension, for instance; a listener must identify the boundaries of major phrases of a sentence, the type and internal structure of each, and the relations between phrases. Clark and Clark (1977, pp. 57-72) review the evidence for seven strategies which yield such a parsing, and almost every other recent discussion of comprehension in general has proposed processes with similar outcomes (Fodor, Bever, & Garrett, 1974; Kimball, 1973; Massaro, 1975). Accordingly we assume that a crucial aspect of language acquisition is building up tacit knowledge about constituents and their properties, sufficient to permit rapid recognition of surface structure.

For this reason we have studied children's implicit parsing of English sentences, using a paradigm in which children demonstrate that they can isolate major surface phrases of various types. This parsing is implicit in the sense that the task requires no conscious formal analysis and no grammatical terminology. The children were seven-year-olds, innocent of any grammatical training. We chose this relatively advanced group of language-acquirers because they could perform our task, revealing aspects of their parsing capacity. More basic reasons for studying seven-year-olds are that children's knowledge of surface structure takes on special importance when they encounter reading and writing and that evidence is accumulating that acquisition is not complete at this age in significant respects (C. Chomsky, 1969; Roeper, this volume).

Our study of parsing has uncovered support for both of these suppositions.

There are several types of cues to surface constituency, including the form-class membership of lexical items (e.g., nouns vs. verbs), the syntactic implications of particular function words and affixes, and prosody. Studies of comprehension have tended to emphasize the lexical and syntactic cues rather than the prosodic. For example, Bever (1970) puts forth some perceptual strategies based on recognizing sequences defined in terms of form classes, such as N V N. Clark and Clark (1977) mention the anticipation of structure appropriate to particular function words, affixes, and verbs among probable comprehension mechanisms. Garrett (1978, p. 620) suggests that perhaps the "assignment of open-class elements to their appropriate grammatical category is a function of the identification and ordering of closed-class items."

These syntactic cues all depend upon the recognition of particular lexical items or function morphemes. For instance, the English verb give allows particular syntactic expectations; roughly speaking, it must be followed by two noun phrases or a noun phrase and a prepositional phrase. But to take advantage of this fact, a parser must recognize the item give, distinguish it from the noun give, and must possess the appropriate lexical information. Prosodic cues are of a somewhat different character. They do not usually depend upon the occurrence of particular lexical items, but rather on the gross syntactic structure of a sentence, its length, and its function (e.g., questions vs. statements).

Separating these correlated properties of surface constituents as they affect performance and acquisition is not easy. Indeed, many of

them are interdefined. For example, a speaker of English knows that the begins a phrase which must terminate in a noun, but a word is a noun partly because it occurs at the end of such phrases. Nevertheless, it may well be that the implications of some types of cues are learned earlier than others. One of our goals, then, in studying children's parsing in comparison with that of adults, is to determine the relative salience of various sorts of cues to constituency. If certain cues exert greater influence on children's parsing than others, or if certain cues influence children more than adults, then these are plausible candidates for earlier or more basic roles in acquisition.

In passing, we may note that identifying form-class membership, even with the aid of diagnostic affixes, is a somewhat uncertain matter in English and must be especially so for children. Many high-frequency nouns and verbs in the language are homophones, such as fly, walk, work, hold, and match. In fact, noun/verb ambiguity is productive in coinages. Creations like phase out or rip off regularly spread from one class to the other.

Further, inflectional affixes which might indicate form-class membership are themselves often ambiguous. Plural or possessive endings, which help to identify nouns, are homophonic with the third-person singular affix on verbs; thus matches is still ambiguous. Likewise, the -ing form which signals a main verb in the progressive aspect is homophonic with the affix on present participles and gerunds.

In the case of children especially, one must add to these considerations the effect of encounters with new vocabulary. If children of age

six have learned as many as 14,000 words, nine new words per day (Carey, 1978, p. 264), then their parsing routines must readily accommodate new words, including familiar-sounding words in a new grammatical role. In short, the fact that pervasive form-class ambiguity is tolerable in comprehension and acquisition shows that in parsing, form-class identification is supplemented by various other strategies such as those mentioned above.

The Task

In order to study the salience of particular cues in the recognition of constituent structure, then, we developed a paradigm in which a person is presented a variety of spoken sentences and is readily trained to isolate and repeat just a particular constituent of each sentence, such as the subject noun phrase. The task is that of repeating selected structures and therefore requires the listener to parse the presented sentences, at least partially. In that the listener must manipulate sentences in a novel way, this may be seen as a metalinguistic task, having some properties in common with the interpretation of difficult utterances (Gleitman & Gleitman, 1970), judgments of syntactic structure (Levelt, 1970), or judgments of well-formedness (deVilliers & deVilliers, 1972; Gleitman, Gleitman, & Shipley, 1972). Like these other metalinguistic tasks, ours elicits considerable individual variation in performance in some cases. However, our task requires no normative evaluation, no grammatical terminology, and a minimum of explicit awareness of structure.

In fact, isolating and repeating a particular constituent of sentences is not so novel a performance as it might at first appear. Our task has a close analogue in "echo" or confirmation questions where, for instance, speaker A says, "I just saw Professor G------- coming to class on her motorcycle," and speaker B replies, "on her motorcycle?". Likewise, corrections often repeat just the faulty constituent, and answers to WH-questions generally consist of just the questioned constituent. These everyday performances constitute natural analogs to our experimental task and show that no conscious analysis may be necessary. They also provide one kind of evidence from which constituent structure may be learned.

Our paradigm takes the form of a game called Walrus and Alligator. (We took the name and adapted the procedure from Langendoen [1970], who suggested a similar technique to demonstrate that speakers follow linguistic rules in forming tag questions.) In our version, the subject (a child, let us suppose) sits down at a table with two adult experimenters, one named Walrus and the other named Alligator. Walrus is to say a sentence of English, and Alligator is to "repeat back a special part of that sentence." First the adult Alligator demonstrates, consistently repeating, say, the subject noun phrase of the sentences which Walrus produces. After five such demonstrations, the child is permitted to play the role of Alligator. (From this point on, the adult Alligator functions only as observer.) Besides providing the sentences, Walrus gives consistent feedback, telling Alligator whether Alligator has repeated the "right part" of the sentence, and if not, repeating the

right part. In our experiments using a sequence of, typically, some 15 sentences, we studied children's learning, their ultimate success in picking out the target constituent, and the nature of their errors. Into this basic scheme we introduced certain variations appropriate to the experiment, as reported below.

The Subjects

The children in our experiments were seven-year-olds from McFarland (Wis.) Elementary School. McFarland is a community of 2,400 children from a mixture of social classes, representing suburban/exurban and rural backgrounds. Our linguistic adults were paid undergraduate volunteers from the University of Wisconsin-Madison. Clearly, the children and adults differ in respects other than age; the adults represent a population socially and academically selected for university attendance. Gleitman and Gleitman (1970), among others, have shown that this kind of selection can strongly affect metalinguistic performance. Accordingly, the best we can say is that we have two groups which differ most strikingly in age, but which probably differ in other relevant respects as well.

The Results

Subjects and Predicates

First we found that children (and adults) can be trained to repeat the subject noun phrase, even though the children (and some adults) lacked any training in grammatical analysis and had no name in mind for that constituent. For the subject noun phrase as target, our results

are displayed in Table 1. Overall, the children correctly repeated 57% of the subject phrases, and 49% of the predicate phrases. The adults were tested in a somewhat different way; they repeated subject noun phrases only en route, as it were, to dealing with more difficult cases to be described below. Nonetheless, 100% (26) of our adults reached our criterion of correctly repeating four subject noun phrases in a row. Most (81%) did so on their first four tries after the demonstration. Thus, most children and all adults reached criterion and correctly repeated most of the subject noun phrases in the sentences presented. In these instances, the subject noun phrases were deliberately varied in length, complexity, animacy, position of the head noun, and in what kind of word followed the subject noun phrase (e.g., an auxiliary, a main verb, or an adverb). No shortcut strategy that we can think of, other than identifying the subject noun phrase itself, would have led to consistent success. Nor does it appear that the children or adults employed such a strategy, repeating all the words up to the first auxiliary, for instance.

An additional indication that children can learn to identify major constituents is that they succeeded in picking out predicate phrases or verb phrases. (Only 3 of these 14 children had participated in the experiment with subject noun phrases 3 weeks earlier.) Again, we varied the predicate phrases in structure and length: they began with be (progressive), have (perfect), a modal, or a main verb and they ranged from three to six words in length. The results, summarized in the second column of Table 1, are quite comparable to those for the

Table 1

Percentages of Seven-year-olds Achieving

Criterion Accuracy in Repeating Subjects and Predicates

	Subject	Predicate
At least 8 of 15 trials	69%	71%
At least 4 trials in a row	69%	64%
n	13	14

subject noun phrase. The children repeated 49% of the predicates or verb phrases correctly, and 10 children (71%) answered more than half of the sentences correctly. The similarity between the subject and the predicate results is not surprising, because in all of our sentences, the two were complements: the predicate phrase consisted of everything that followed the subject noun phrase. However, there is some evidence that children may not have simply chosen the complement of the subject noun phrase in order to identify the predicate.

One such bit of evidence is that children tended to repeat the verb phrase, rather than the full predicate phrase, even though Walrus insisted on the latter in giving praise and feedback. That is, the children tended to omit any auxiliary preceding the main verb in the nine sentences which contained surface auxiliaries. The high level of success reported above is true only if one accepts either the verb phrase only or the full predicate phrase as correct. The children actually repeated the full predicate on just 29% of the trials overall, and on 39% of the trials for the six sentences with auxiliary. These results can be explained either in terms of the integrity of the verb phrase as a psychological constituent, or in terms of stress: the main verb was the first stressed word with a full vowel in the predicate phrase. This latter interpretation is consistent with the hypothesis that children simply chose whatever followed the subject phrase as the predicate only if one is willing to assume that they then forgot the initial unstressed words. An additional respect in which the subject and predicate strategies appeared to differ is reported below.

Accepting the more generous interpretation of "correct" in this experiment, it is interesting that the results are comparable to those with subject phrases, for the two seem to involve somewhat different requirements. When the target is the subject phrase, one need not listen to the remainder of the sentence at all, once one is certain of having identified the target. When the target is the predicate, however, one must listen to the entire sentence, in order to identify the beginning of the predicate and then to remember it. On the other hand, the length of time during which one must remember the target, having identified it, differs in the opposite direction.

Nonconstituents

To place the success with subject noun phrases in perspective, it is important to consider the same task where the target was a nonconstituent of similar length and position in the sentence. We attempted to train children to repeat just the first four words or the first four syllables, for instance. The results are presented in Table 2. Though it is difficult to say what constitutes chance performance on this task, it seems unlikely that the children were more successful than one would expect if they were simply repeating a random portion of the beginning of the sentence. Overall, children identified the first four words on only 19% of the trials and the first four syllables on only 20%; no child succeeded with any consistency. Admittedly, this result is unsurprising, because in our attempt to create a nonconstituent, we required the child to count words or syllables, a thoroughly counter-intuitive requirement, perhaps.

Table 2

Percentages of Seven-year-olds Achieving

Criterion Accuracy in Repeating Four-element Nonconstituent

Sentence Fragments

	Four words	Four syllables
At least 8 of 15 trials	0	0
At least 4 trials in a row	0	0
n	11	8

Next, then, we defined a nonconstituent in terms of a constituent: The task was to repeat the last word of the subject noun phrase and the word which followed it, i.e., the first word of the predicate. Thus whatever cues the children relied on to identify the subject phrase, plus the ability to identify a single word, would suffice for this task, and yet the target was a nonconstituent. This experiment we carried out identically with both children and adults; Table 3 presents the results.

Note that we did this with very few children (n=6) as a matter of mercy; they were lost and hated the task. Clearly, neither adults nor children identified the nonconstituent as well as the subject noun phrase, even though the two were closely related. Overall, children responded correctly to 10% of the items and adults to 70%. The children failed to do better than chance, certainly, while the adults varied considerably, from one-third to all correct. The individual variation that is typical of difficult metalinguistic performances showed up in this task of recognizing a nonconstituent. Thus it seems fair to conclude that the subject noun phrase is much more accessible than a comparable nonconstituent.

This evidence simply supports the widespread conviction that major surface constituents are, in various senses, psychologically real and accessible. It is notable that the subject noun phrase is marked in multiple ways: it is both a syntactic and a semantic unit, ordinarily. In the sentences that we used, the last word of the subject noun phrase was always a noun, either the head noun or the object of a preposition.

Table 3

Percentages of Subjects Achieving Criterion Accuracy

in Repeating Nonconstituent Two-word Sentence Fragments

	Children	Adults
At least 9 of 18 items correctly	0%	83%
At least 4 in a row	0%	70%
n	6	23

This noun was sometimes marked by a plural affix. Moreover, a subject noun phrase of more than one word is usually marked off by a characteristic prosodic contour to be discussed below.

Single-Word Subjects

There was, however, one surprise: while children succeeded in identifying subject noun phrases of from two to six words in length, they utterly failed with single-word subjects. There were 2 sentences with pronominal subjects in our original list of 20 sentences for the subject noun phrase experiment. (In order to discount the effects of these single-word subjects and possible fatigue effects, we have reported only the results from the first 15 sentences above.) Of 13 children, none correctly repeated either of the pronominal subjects. Recognizing this tendency, we substituted one sentence with a single-word lexical-noun subject into our list, namely "Bees sting people in the garden." Of the eight children who tried it, none succeeded with this sentence either. This failure with single-word subjects, both pronouns and a noun, suggests that prosody may be a major cue to the identification of subject noun phrases; single-word subjects are typically not marked prosodically, as multiple-word phrases are, but are part of a phonological phrase which includes the main verb.

To evaluate this suggestion, we undertook two further experiments, one to examine the difficulty with single-word subjects more closely and the other to test for an effect of prosody. In both studies, we first presented varied multiple-word subjects of the sort which we had found to be relatively easy for children. When a child had successfully

repeated four subject noun phrases in a row, we switched to a new list containing either single-word subjects or misleading prosody (to be described below). In that way, we established the concept of repeating the subject noun phrase and then observed the effect of one-word subjects and of prosody. Both of these experiments involved much larger numbers of children, as well. No child who participated in this second pair of experiments had taken part in the earlier ones.

The single-word subject condition confirmed that seven-year-olds can generally identify multiple-word subject noun phrases in this task. Sixty-four percent (25 out of 39) of the children reached our criterion, correctly repeating 4 multiple-word subject phrases in a row within the first 10 trials. With those who met this criterion, we continued with 13 additional sentences, 9 of them having single-word subjects of various types. The four multiple-word subjects were mixed in to discourage a strategy of simply repeating the first word, and as a check on whether children were in fact adopting such a strategy.

Basically, the single-word subjects indeed proved more difficult, but children could partially overcome this difficulty: they repeated 40% of them correctly overall. At the same time, they continued to succeed with the multiple-word subjects, (69% right), so they were not merely repeating just the first word regardless of structure. The presence of an explicit noun-like suffix proved to be irrelevant. With marked plurals (four instances) children got 48% correct; with non-count, hence unmarked, nouns (three instances), they got 55% correct.

One type of single-word subject continued to pose seemingly

insuperable difficulty, however, namely pronouns. In attempting to identify the two pronouns among our nine single-word subjects, children were right just 4 times out of 50 tries. Thus the overall 40% correct figure is misleading; children correctly identified single-word nouns 49% of the time, while they identified pronouns just 8% of the time.

The characteristic error in repeating a single-word subject was to repeat the first few words of the sentence, usually ending at a phrase boundary, rather than to repeat a noun phrase from another position in the sentence. For example, for "He could not answer all my questions," 16 out of 22 errors (73%) consisted of "He could not" or "He could not answer," while only one child said "questions" and one, "all my questions." Thus both initial position and the notion of a constituent appear to have determined children's responses.

In sum, then, the single-word subjects were indeed somewhat more difficult than the multiple-word ones, but most of that difficulty occurred with the first such subject, understandably, and with the two pronouns, not-so-understandably. However, when one excludes these three troublesome items, the difference between single- and multiple-word subjects is still statistically significant (χ^2 (1) = 6.12, $p < .05$). The difficulty with pronouns cannot be attributed to their lack of noun-like inflections or to their monosyllabic form, since these factors did not influence our results with nouns. The five monosyllabic nouns were correctly identified in 49% of the trials and the two polysyllabic ones in 48%. In fact, except for the three difficult cases, the success rate with single-word subjects of different types is remarkably uniform (see Table 4).

Table 4

Percent of Seven-year-olds Who Correctly Repeated

Subject Nouns from Sentences

(n = 25)

Subject noun	Percent correct
toys	24%
soup	48%
we	3%
elephants	52%
soap	56%
he	12%
people	48%
ghosts	80%
bees	36%

Though pronouns differ from multiword noun phrases in several respects, it is not obvious which property might account for the difficulty in identifying pronouns as constituents. Compare, for example, the following items:

16. My best friend and I are selling lemonade.

19. We entered the spooky old house through the window.

More than half the children identified the five-word subject in the former; none identified the pronoun in the latter. Clearly, the use of we in item 19 is not typical of ordinary language use in that it has no referent in the other sentences or in the situation, but of course the same was true for the subjects of all our sentences. Pronouns may in fact need contextual reference more than lexical nouns do, because they appear to lack a meaning of their own. That difference is only a matter of degree, however. We has at least the semantic specifications <+ human> and <+ plural>, together with the specifications that these redundantly imply, such as <+ concrete>, as well as the implication that these humans include the speaker. Thus the pronouns we used were not semantically empty. "My best friend and I" has this same semantic content, plus the specification that the group consists of two people, and the content of "my best friend." It is not obvious that this difference in degree of semantic specificity should render pronouns transparent in parsing.

We are inclined to attribute the difficulty of pronouns not only to their comparative lack of semantic content, but also to the complete absence of suprasegmental marking on pronominal subjects. Supporting

the importance of low-level phonetic properties are the results with one particular sentence: "Ghosts come out after dark." Because of the cluster of consonants ([stsk]) at the subject/predicate boundary, Walrus tended to stress and articulate the word "ghosts" especially carefully. This turned out to be by far the easiest of the single-word subjects (80% correct).

We replicated the single-word subject experiment with our linguistic adults (n = 14). One can barely discern a similar pattern, in that toys, the first single-word subject, and we were the most difficult, but the errors are so greatly reduced that there are no significant differences across subject-types. The undergraduates identified 91% of our mixed single- and multiple-word subjects correctly.

In the light of the difficulty with pronominal subjects, let us reexamine the question of whether there may be a difference between children's strategies for identifying the subject phrase and those for the predicate phrase. Five of our 15 sentences in the predicate phrase experiment had pronouns as subjects. Children were no worse in identifying the predicate phrases of these sentences than of the others, which had subject phrases two and three words long. In fact, they were (nonsignificantly) better; the mean number correct was 7.2 versus 6.6. Since entirely comparable groups of children were very poor at identifying pronominal subjects in two other experiments, we conclude that the children probably did not identify the predicate phrase as the complement of the subject, or indeed vice-versa.

But does the difficulty of single-word subjects simply reflect a

difficulty in identifying a word? On a small scale, we tested whether children of this age have difficulty in identifying a first word regardless of its syntactic function. With five children, six and one-half to seven years old, we played Walrus/Alligator, using simply the first word as target. The sentences were those of our original subject phrase experiment, with minor changes to eliminate the repetition of certain first words, such as "the"; the children had not participated in any previous experiment.

Every child exceeded our criteria for success; the mean number correct was 14.6 out of 20 trials, with an average of 9.2 in a row correct. Thus a nonconstituent can be identified if it is very short Interestingly, every child identified the two pronominal subjects correctly, even though these were the same words in the same sentences and the same position in the sequence as in our subject phrase experiment. Thus, first words and pronouns in particular are difficult for children to identify only when the task is to identify a constituent; the difficulty does not inhere in one-word targets per se. This distinction would be predicted if children rely heavily on prosodic cues in identifying the constituent; they could not use such cues to identify single words in general, and would have to rely on lexical recognition. (Also interestingly, the children did not need to be aware of the notion "first word" in order to succeed; four of the five could not name the unit after they had completed the game. Nevertheless, they must have inferred from the demonstration that the target was a single word, for

on no trial (total = 100) did any child produce more than one word.)

In an effort to separate the semantic from the prosodic peculiarities of pronouns, we played another version of Walrus and Alligator with a new group of 14 seven-year-olds. In this version, after the children had learned the game and had reached criterion with the same 10 sentences used to introduce the single-word subject experiment, Walrus began to produce sentences which formed a connected discourse, a version of the Little Red Riding Hood story. Nine of these 14 sentences had personal pronouns as subjects. Beginning with the second sentence it was clear that the sentences formed a discourse, and that the pronouns referred to nouns mentioned in previous sentences. Otherwise, the procedure was the same as in other versions; Alligator responded after each sentence, with the subject noun phrase as target.

Giving pronouns an anaphoric referent in this manner dramatically improved their accessibility. While seven-year-old Alligators had identified the two (non-referential) pronouns in the single-word subject experiment only 8% of the time, they identified these referential pronouns in 46% of the trials. This figure is slightly enhanced by the repetition of particular pronouns, especially she referring to Little Red Riding Hood; on the first occurrence of each of the four pronouns, children responded correctly on 41% of the trials (excluding the first item with a pronoun, which no child correctly repeated). This proportion is significantly different from the proportion (61%) with the five non-pronominal subjects ($t = 2.28$, $df = 13$, $p < .05$), so there remains an effect which we attribute to prosody.

As noted above, it is only pronouns which appear to require this intersentence reference, and this effect is true only of children. In the same experiment, with very slightly modified stimulus sentences, adults identified over 90% of the subjects, pronominal and otherwise, just as they had in the single-word experiment. Our conclusion is that both relative lack of semantic specificity, requiring anaphoric support, and a lack of phrase-like prosody contribute to the transparency of pronouns for children.

Misleading Prosody

To test for an effect of prosody more directly, we conducted an experiment using sentences which had misleading prosodic contours near the subject/predicate boundary. Again we introduced our putatively difficult cases after children had identified four consecutive ordinary (multiple-word) subject noun phrases. Again, most seven-year-olds reached this criterion: 71% (25 of 35). The misleading sentences were tape-recorded, in order to control prosody; consequently, we presented the demonstration and the initial (reach criterion) sentences via recordings as well. As in the single-word condition, there were 13 test sentences after a child reached criterion, nine of them having a misleading prosodic contour and the other four having multiple-word subjects and normal prosody.

We constructed the misleading stimuli by tape-splicing. For example, we recorded normal pronunciations of the following sentences:

(a) Your neighbors shovel their sidewalk carefully.

(b) Your neighbor's shovel got lost in the snow.

We then spliced the underlined portion of (b) in place of the underlined portion of (a). The result is a recorded sentence (without extraneous noise from the splice) in which the prosodic contour appropriate to a subject noun phrase falls, misleadingly, on Your neighbors shovel. Specifically, the prosodic break appropriate to the last word of the subject noun phrase actually occurs on shovel, the main verb. The resulting pattern, though subtle, is noticeably abnormal.

Other stimuli are misleading in the opposite way: The prosodic contour terminates before the end of the real subject noun phrase. Thus, we spliced normal recordings of sentences (c) and (d):

(c) Our dog's bark sometimes frightens people.

(d) Our dogs bark at the neighborhood cats.

replacing the underlined portion of (c) with the underlined portion of (d). Thus in this case, the first contour appropriate to a subject noun phrase occurs on our dog's, which is not the complete subject phrase.

A third subtype of misleading stimulus also has the prosodic contour terminating before the end of the real subject noun phrase, but in these cases, the misleadingly-marked pseudo-phrase can not be a subject noun phrase syntactically. For example, we spliced the underlined portion of (f) into the underlined position of (e):

(e) When they are wild, animals are brave.

(f) Trainers of wild animals are brave.

Thus the pseudo-phrase Trainers of wild has a contour (including a noticeable pause) which would normally be appropriate to a syntactic constituent.

With all three types, we were interested in whether the prosody would affect children's (and adults') responses on the Walrus and Alligator task, whether children could overcome any misleading effects, and whether mistakes would tend to follow the prosodic contour. What we found was a large effect of prosody on children: The seven-year-olds (n = 25) got only 30% of the sentences with false contours correct, while continuing to perform at a high level with the four normal sentences (83% correct). Moreover, 78% of the errors followed the misleading contour, i.e., the child's repetition ended where the prosodic phrase ended in the stimulus.

Children were somewhat more likely to repeat incorrectly when the prosodic break came before the head noun (83% wrong) than when it came later (56% wrong), suggesting an interaction of syntactic and prosodic cues. That is, when children had already encountered a syntactically-plausible subject phrase, they were somewhat less likely to be misled by prosody. On the other hand, children were just as likely to make an error when the prosodically-marked pseudo-constituent could not have been a noun phrase (e.g., Trainers of wild) as they were in the four comparable cases in which it could have been (e.g., Our dog's). This observation, however, does not mean that the children were making no use of syntactic or lexical information and were simply following prosody wherever it led. For one thing, both cold and wild, at the pseudo-boundaries, can be used as nouns; they exemplify another form-class ambiguity in English. Moreover, the children in fact followed prosody less frequently when it marked off a sequence that would not ordinarily

be a noun phrase; they made errors just as often, but those errors matched the falsely-marked sequence less frequently (55% vs. 77%). Finally, children did grow somewhat better at ignoring the misleading contour: With the first three sentences, they were right only 26% of the time; with the last three, they succeeded 48% of the time.

Our adult listeners (n = 12) were far less affected by the misleading contour. They were misled by prosody 18% of the time, while they were nearly perfect in identifying ordinary multiple-word subjects and single-word subjects after the first item or two. The adults were also more aware of the misleading prosodic contour.

The Prosodic Cue(s)

In summary, we observed that children have much greater difficulty than adults in learning to pick out single-word noun phrase subjects, even though they are relatively successful in identifying multiple-word phrases. In addition, they have greater difficulty in ignoring the misleading contour which we created by grafting the prosodic pattern appropriate to one structure onto another. These two observations are consistent with the hypothesis that children rely more heavily on prosodic cues than do adults, even when other cues, such as lexical category membership, are more appropriate.

What might these prosodic cues be, specifically? Of the possibilities, namely stress, pitch, duration, and pause, one's first candidate must be duration. Investigators such as Martin (1970) and Klatt (1975) have shown that segments tend to be substantially longer when they immediately precede major constituent boundaries. Klatt (1976) reviews

syntactic effects on duration, specifically including the subject-predicate boundary. Also, several experiments have shown that speakers use duration at constituent boundaries to distinguish potentially ambiguous utterances (Lehiste, Olive, & Streeter, 1976; Cooper, Paccia, & Lapointe, 1978). In part these findings were anticipated by Martin Joos in a 1957 conference (Joos, 1962). Martin (1972) has shown that rhythm, in the sense of timing between stressed syllables, can play a role in the recognition of hierarchical structure. Nooteboom, Brokx, and de Rooij (1978, pp. 95-98) report a series of experiments on the interpretation of ambiguous Dutch sentences in which syllable lengthening was more effective than pitch change in marking syntactic boundaries. Informally, these investigators also found that pauses alone, without corresponding syllable-lengthening, merely resulted in "unacceptable speech."

Phrase-final lengthening appears to be the most salient and reliable of the prosodic cues in our misleading intonation sentences. We measured wide-band spectrograms of the sentences from which our misleading intonation stimuli were spliced. In every instance involving the subject-predicate boundary (14 sentences), the last syllabic segment before the boundary was longer than that same segment in the same word when it did not precede the major phrase boundary. For example, the vowel of dogs was longer in

(g) Our dogs bark at all the neighborhood cats.

than in

(h) Our dog's bark sometimes frightens people.

Conversely, the /ar/ of bark was longer where it preceded the subject-predicate boundary, i.e., in (h) versus (g). (To achieve reliability, we measured the last syllabic segment together with any sonorant consonant which followed it or glide which preceded it. These are customary units in measurements of durations.) In addition, similar lengthening was apparent in our two remaining pairs of sentences, which involved the boundary between an introductory adverbial clause and the main clause as well as that between the subject and the predicate. Thus 9 sentence pairs out of 9 showed phrase-final lengthening in 18 comparisons. Treated as a binomial event with a null probability of .5, this result is highly unlikely to have occurred by chance alone ($p < .001$).

Moreover, these differences in duration were long enough that they could serve as primary perceptual cues. In the 14 comparisons of subject versus nonsubject position, the segment at the end of the subject noun was longer by just over 30 msec, on the average, or some 28% of the measured duration. These differences exceed those put forth by Klatt as probable minima for duration to serve as a primary cue, namely, 25 msec or 20% (Klatt, 1976, p. 1219). Also, the observed difference falls high within the range of just-noticeable-difference suggested by Lehiste for ordinary (nonoptimal) perceptual conditions, namely 10 to 40 msec (1970, p. 13).

Most importantly, the observed differences in duration appear to have the requisite property of distinguishing between single- and multiple-word subject noun phrases. For example, Goldhor (1976) found

that lengthening is greater in the latter type of phrase, even though as Klatt (1976) notes, this is contrary to the general tendency for speakers to produce longer phrases more rapidly. Such a difference appeared in our misleading sample, too, in the two pairs (a) - (f), above, and (i) - (j) below:

(i) If it's cold, lemonade tastes good.

(j) A drink of cold lemonade tastes good.

In these sentences, from which a misleading intonation stimulus was spliced, the final vowel of lemonade was 25% longer in (j) than in (i), i.e., it was longer when it was part of a multiple-word subject.

Thus for the sentences in this experiment, phrase-final lengthening is statistically reliable, is large enough to serve as a perceptual cue, and correctly predicts the distinction between single- and multiple-word subjects. In the same sample of sentences, we observed no such differences in the other prosodic features. As expected, there were no pauses at the subject-predicate boundary which we could detect on the spectrograms. Nor was the stressed vowel of the subject noun usually the greatest in amplitude within the subject noun phrase. In our 14 comparisons, that vowel was of greater amplitude than any other in the subject noun phrase in only one instance; it was lower in amplitude than some preceding vowel in eight cases and roughly equal to some preceding vowel in the remaining five cases. (We measured relative amplitude from an amplitude section on spectrograms.) Our findings were similar for pitch: On narrow-band spectrograms of the actual misleading-intonation sentences, the word marked by the (false) prosodic break

typically had a distinct fundamental frequency contour, but these contours were quite varied, including every possible type: fall, rise, fall-rise, rise-fall. Nor was the total amount of frequency change greater than that on other words in the sentence.

We do not suppose that this preliminary evidence, obtained with comparatively crude acoustic measurements of one speaker, settles the issue of what prosodic cues mark off major constituents. It is entirely possible that more thorough studies, using sophisticated measures of speakers under varied conditions, may show that amplitude and fundamental frequency interact with duration. In fact Streeter (1978) has shown that listeners use both pitch and duration in parsing ambiguous algebraic expressions, such as "(A plus E) times 0." Streeter suggests that the two cues are additive in predicting listener's judgments. We simply report that phrase-final lengthening was a large and reliable contrast in the sentences that we used to create our misleading-intonation stimuli and that no other cue (including form-class membership) was as reliable.

Alternatives and Implications

An alternative interpretation of our results, suggested by Janet Fodor and by Kenneth Wexler, is that the children may have viewed their task as a kind of question/answer session, in which, when the target was the subject, the implicit question was, "Who did it?" or something of the sort. Because he by itself is not normally the answer to such a question, this interpretation might account for the difficulty of

pronouns. This possibility seems to us unlikely. Because of the variety of sentences that we used (see Appendix), it is difficult to compose a single appropriate question without resorting to a very general "topic" question, such as "Who or what is this about?" In any case, no question that we have thought of accounts for the relative difficulty of single-word subjects in general; soup or elephants or people are perfectly good answers and yet these were all more difficult for children than multiple-word phrases.

The prosodic account, on the other hand, correctly predicts the increasing difficulty of multiple-word phrases, single-word subjects, and pronouns; pronouns are most likely to form a single phonological phrase with all or part of the predicate, while single nouns are less so, and multiple-word phrases least so. It is this gradient, together with the effects of misleading intonation, which most directly supports the role of prosody in children's performance.

Notably, the difficulty of pronouns is precisely the opposite of what might have been expected. The word he at the beginning of a sentence gives unambiguous structural information; barring "He who. . ." relative clauses, it must be the entire subject noun phrase of a main clause. If children were relying primarily on the syntactic implications of particular lexical items, pronouns should be among the easiest subjects to identify, not the most difficult.

On the other hand, the question-answering strategy may account for our results with the predicate phrase. In these cases, the verb phrase corresponds to the word do in a question such as What was he doing?

With appropriate substitution of subjects and auxiliaries (What should they do?), such a question can be constructed for each of the sentences in our predicate phrase experiment except for one which has seems as a main verb. This interpretation would account for children's tendency to repeat just the verb phrase and for the lack of any effect of pronominal subjects. Prosodically, it is predictable that children would use different strategies for the subject and the predicate, for the beginning of the predicate is not marked by the kind of prosodic cue which marks the end of the subject. Unless the children assumed that the predicate must be the complement of the subject, they would have to use a nonprosodic strategy to identify it.

The Walrus/Alligator parsing task may involve a degree of metalinguistic judgment, or at least performance should be facilitated by some syntactic awareness. Nevertheless, our impression is that children and most adults applied little or no explicit analysis of structure. The children, certainly, lacked any grammatical training and could not have named the constituent they were repeating. Surprisingly few of the university undergraduates could do so correctly when asked, either, saying for instance, "I never was much good at that sort of thing [grammar]."

At the opposite extreme from metalinguistic calculation, the task might have elicited too shallow an approach, in which Alligator sought only the first prosodically-marked phrase, with no attention to syntax or semantics. But children's and adults' partial success with single-word subjects, misleading intonation, and predicate phrases all

suggest that they did not adopt this strategy alone. Indeed, their partial success with subject phrases that were quite varied in form and meaning seems to rule out a number of other conceivable ad hoc strategies.

As a more demanding test of how well children can identify subject noun phrases, we played Walrus and Alligator with 13 more seven-year-olds, using a list of sentences some of which had an introductory adverbial phrase before the subject noun phrase. A sample sentence was:

This evening Mom and Dad are going to a party.

In such sentences, the subject noun phrase is the second prosodically-marked phrase, so Alligator must identify its beginning as well as its end. In this version of the task, children performed well, as usual, on sentences without introductory adverbials: 79% correct on six items. Predictably, they did less well on the harder sentences: 47% correct on eight items. However, this result shows that they were neither guessing nor repeating just the first prosodically-marked phrase.

Not all adverbials proved to be of equal difficulty. With those of more than one word (Before the movie, After Mary's nap, For her birthday, This evening, Once in a while, Next year), children were correct on 54% of the trials, but with morphologically-marked single words (Luckily, Usually) on only 27%. Moreover, children did worse with a subject pronoun:

After Mary's nap, she felt better. (31%)

and worst of all on a sentence with both a single-word adverbial and a single-word subject:

Usually spiders don't bite you. (15%)

Nine of 11 errors on this last sentence were spiders don't bite you; that is, children tended to identify the prosodically more distinctive boundary. In sum, seven-year-olds can identify medial as well as initial subject noun phrases, though less readily, and the difficulty of single-word phrases is again evident.

The Walrus/Alligator paradigm might be applied to a wide variety of constituents and adapted in various ways. Extensions of these initial studies might aim to determine more precisely the sorts of non-constituents which are accessible, to control more deliberately the prosodic cues and their interaction, and to present more varied predicates, including predicated adjectives, so that do is not a possible paraphrase. By extending the technique to embedded clauses, one could contrast such notions as "first subject" with "main clause subject." One might test the suggested development in parsing strategies by working with younger children, but it would evidently be necessary to modify the task, for in a pilot study with 14 five-year-olds, only 3 were able to identify 4 or more consecutive multiple-word subject noun phrases within 10 trials.

Comparison to Children's Spelling

In previous work, one of us (Read, 1975) has analyzed the spelling of children in the preschool years and the primary grades. He found certain frequent patterns of nonstandard spelling; for example, children use the letter A to represent the vowel of bet as often as

50% of the time overall. In explanation of such patterns, Read hypothesized that children tend to spell alike those speech sounds which they perceive as similar, thus choosing for /ɛ/ the letter which is a standard spelling for /e/ and /æ/. These three vowels are indeed phonetically similar; together they occupy the mid/low front quadrant of the vowel space in English, whether "vowel space" is defined acoustically or articulatorily. In support of this hypothesis, Read put forth several kinds of evidence: Children make other pairings of sounds with spellings (including other vowels) which can be explained by the same principle, even children who do distinguish /ɛ/ from /æ/ in both production and perception nevertheless use the A spelling, and nonspelling kindergarten children reveal a perception of these vowel relationships in certain judgmental tasks. Additional evidence of the spelling patterns and their place in a developmental sequence has come from several investigators, working in diverse dialect regions (Beers, 1975; C. Chomsky, 1971a, 1975; Gentry, 1977). The hypothesis that these spellings derive from children's assuming that similar sounds should receive similar spellings has three lines of support: the spellings themselves, the phonetic similarities, and the elicited similarity judgments.

The relationship between this work on spelling and the present research is this: In both cases children appear to be relying on superficial phonetic cues for relatively abstract judgments, namely, for categorizations of speech sounds (for spelling purposes) and segmentation of sentences (in the Walrus/Alligator task). The children involved were of approximately the same age, the age at which they enter

school and encounter formal instruction in the written language and other tasks demanding an awareness of language. In addition, the phonetic cues which appear to be salient in each case are outside the awareness of most adults, so that the children's behavior seems obscure. For instance, no literate adult would think of BAT as a plausible or even explicable spelling for bent, though young children create such spellings quite frequently.

Nevertheless, for children of this age to rely on superficial properties of speech sounds when judgments are required seems quite natural. The role of prosody is consistent with the fact that children learn to produce suprasegmental patterns very early, certainly within the first year of life, and before mastering segmental phonology or producing recognizable words. For a brief review of the evidence, see Li and Thompson (1977, pp. 185-186). When children enter school, their primary, often nearly exclusive, experience of the language has been with its spoken form. They are unaware of the more abstract bases for adult judgments, such as the sound-spelling correspondences and the morphological and historical relationships which underlie English spelling. Similarly, in segmenting sentences into constituents, children may be less inclined to rely on lexical and syntactic cues to phrase structure and more likely to look for phonetic signals. In both kinds of performance, children in the early school years appear to assume that information relevant to segmentation and categorization will be available superficially. We suggest that language development during the school years involves moving toward reliance on more abstract categories and relations.

A Relation to Reading

The relationship between children's spelling and their identification of constituents is not only that both are tasks in which children use phonetic cues where adults make more abstract judgments. In addition, both may reveal aspects of children's initial approach to reading and writing. We are willing to speculate that children's reliance on prosodic cues in identifying constituents may help explain a particular well-known problem in learning to read.

A significant proportion of beginning readers have difficulty in comprehending what they read, even when they can identify ("decode") the individual words and could comprehend the same sentence if it were spoken or read aloud. Such readers are known as "word callers"; they name the words in the text but fail to comprehend. Interestingly, teachers traditionally use the child's prosodic pattern as a tacit diagnostic tool; when the reading has list-intonation, the teacher suspects that the child does not understand and begins to ask comprehension questions.

Comprehension difficulties of this sort are exactly what one would predict, considering that prosodic cues appear to play a major role in children's recognition of constituent structure. That is, if children rely heavily on duration as a cue to structure in comprehending speech, then difficulties ought to arise in beginning reading, for prosodic cues are not systematically preserved in written language. Punctuation represents some such information: Periods at the ends of sentences, commas after introductory clauses, and various marks around parenthetical

modifiers indirectly correspond to structural information signalled prosodically in speech. But other sentence-internal structure is not represented, including the subject-predicate boundary and embedded clauses, such as complements and restrictive relatives. Indeed, it may be that one reason that adults were able to deal with misleading and, for single-word subjects, missing prosodic cues is that they had learned to read.

Thus, we suggest, one important aspect of learning to read is learning to parse written sentences on the basis of form-class patterns, diagnostic inflections, function words, and punctuation, compensating for the lack of prosodic cues. Since most children do acquire this capacity, albeit some of them with great difficulty, it is worth asking how such learning might take place. Learning to recognize the syntactic structure of the language all over again seems improbable, since many children learn to read in months, not years. Therefore presumably a child applies the knowledge of the language which he or she already possesses to the task of parsing without benefit of prosody. Clearly a first grader can bring to bear considerable knowledge of the lexicon and of syntax, though not of punctuation.

Another resource for the beginning reader is experience in organizing speech for production, i.e., of planning syntactic constructions and applying appropriate prosodic contours to them. As noted above, these prosodic signals of syntactic organization are found in children's earliest speech. (Language acquisition research has relied heavily on such markers in young children's speech, e.g., to define an "utterance"

at the early stages.) Quite possibly in learning to read, a child transfers syntactic knowledge previously embedded in production routines to new routines for comprehending written language. For instance, in an analysis-by-synthesis strategy, a child might determine, partly on the basis of context, what a sentence means, then produce the appropriate utterance, and then observe how that utterance is realized in print. One fact in support of such a learning process is that learning to read almost invariably includes a stage of reading aloud, though there are other reasons for this stage as well, such as teachers' need to monitor progress. Also, being read to is a good predictor of children's success in learning to read; this sort of reading, often with very clear or even exaggerated prosodic contours, provides similar opportunities to compare spoken sentences with written ones and to build up strategies for parsing the latter.

A third way for a beginning reader to compare sentences of known constituent structure with their written forms is to produce writing. In writing a sentence and reading it back, a child can gain insight into the indirect ways in which constituent structure is indicated. A child who reads past a phrase boundary in a sentence of his own is likely to notice and correct his mistake. This source of experience supports arguments put forth by Carol Chomsky (1971a, 1971b, 1975) that writing, along with reading, should be part of the primary-school curriculum.

Given some reason to think that performance on the Walrus/Alligator task with misleading or missing prosodic cues might be related to reading comprehension, we looked for such a relation post hoc among our first

graders. Unfortunately, no standardized reading comprehension scores were available for most students. We had to settle for the teachers' subjective global assessment of each student's overall reading ability (high, medium, or low) one year after our Walrus/Alligator experiment. Since only two students were ranked "low," we combined them with the "medium" group. It turns out that the high- and the medium-achievement readers differed significantly in number of correct responses to sentences with misleading intonation ($t = 2.36$, $df = 27$, $p < .05$). (See Table 5.) This result is consistent with our hypothesis but no more. Obviously more specific measures of reading comprehension and other tests of the association with parsing would be desirable. Assuming that there is an association, it remains to be learned whether better parsing leads to better reading, or more and better reading leads to better parsing, or some third factor relates to both. We are not aware of more direct evidence linking reading comprehension difficulty with speech comprehension strategies, specifically word-calling with reliance on prosodic cues.

At this moment, then, our evidence provides only vague support for the hypothesis that learning to read involves developing new parsing routines to compensate for the lack of previously-relied-upon prosodic cues to constituent structure, but there is ample reason to consider the hypothesis plausible and worth investigating. Studying the relationship between listening-comprehension strategies and reading appears to be one of the directions in which contemporary psycholinguistics may ultimately make a significant practical contribution.

Table 5

Comparison of Adults and

High- and Medium-achievement First-grade Readers in

Number of Subject Phrases Correctly Identified

Despite Misleading Prosody

	Adults	Good readers	Medium readers
Mean correct responses (of 9)	7.42	3.14	2.07
Standard deviation	1.16	1.41	1.03
n	12	14	15

Conclusion

Methodologically, these Walrus/Alligator studies illustrate a way of testing the accessibility of various surface (and perhaps nonsurface) constituents without requiring overt grammatical analysis. Thus the technique may be appropriate for younger children than judgments of relatedness, as in Levelt (1970) for instance. We think it constitutes a reasonably natural way of asking children to isolate constituents in order to study the relative salience of various cues to phrase structure. It brings to light the tacit parsing which is an essential part of language acquisition and comprehension.

Substantively, these studies indicate that major surface constituents are accessible, more so than nonconstituents of comparable length. They suggest that prosodic cues, particularly phrase-final lengthening, help to identify the subject phrases of sentences, and that children rely on such cues more heavily than adults, even when other structural cues are unambiguous.

As a result, children have greater difficulty in identifying short subject phrases; pronouns are especially inaccessible, but only when the task is to identify a constituent, rather than the first word. This gradient of difficulty, from multiple-word phrases, to single-word subjects, to pronouns is just what one would predict on the hypothesis that children tend to rely on prosodic cues such as duration in identifying the phrase structure of sentences.

These observations lead us to suggest that of the various cues to surface phrase structure, prosody may have a special "boot-strap"

function. Unlike patterns defined in terms of form classes, or the structural implications of particular function words, affixes, or verbs, for example, phrase-final lenthening is in no sense lexical; it does not require the prior identification of morphemes. In certain cases, prosody provides reliable cues to gross surface structure which are accessible with minimal analysis of the acoustic signal and little or no lexical identification. For that reason, these cues may play a special role in the identification of constituent structure and in children's acquisition of that capacity. On that assumption, one would predict, correctly, the existence of certain difficulties in beginning reading comprehension.

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Appendix

Sentences Used in Experiments

I. Subject Noun Phrase

1. The doctor carefully pulled the long splinter out.
2. My older sister should take piano lessons.
3. John and his friends were studying dinosaurs.
4. A very large piece of pie will fill you up.
5. Most of the parents sat together.
6. The store on the corner sells penny candy.
7. All our cabbages and bean plants have died.
8. One of my favorite aunts always bakes cookies for me.
9. The little old lady is knitting a sweater.
10. My father's cab arrived at the airport exactly on time.
11. His new puppy has run away.
12. The girl in the red dress is crying.
13. The first and second graders will be eating late today.
14. The most important guests arrived late.
15. Two of the girls have seen Star Wars.
16. My best friend and I are selling lemonade.
17. He turned down my last offer.
18. Some children in my neighborhood don't have skateboards.
19. That man with the beautiful dog is blind.
20. We entered the spooky old house through the window.

II. Predicate Phrase

1. A clown was leading the parade.
2. They should put their shoes on.
3. The air-conditioner kept him cool.
4. We have been working hard.
5. The boy upstairs can run very fast.
6. That mean dog will bite her.
7. I traded bicycles with Bill.
8. She opened the box carefully.
9. One student brought an apple for the teacher.
10. Some kids finish fast enough.
11. The boys were playing outside.
12. Santa Claus must put his belt on carefully.
13. Our neighbor seems very angry.
14. Everyone was laughing at my sister.
15. My father is working on the car.
16. This winter we will ride our sled.

III. Last Word Subject - First Word Predicate

1. Every day a very large plane lands at the airport.
2. The farmer's tractor broke down.
3. The little baby cried.
4. It will be dark outside tonight.
5. My brother and sister are watching TV.
6. My friends gave some toys to Alice.
7. That poor little kitten in the garden seems hungry.
8. Some kids don't like school.
9. Ghosts come out after dark.
10. Something very heavy crashed to the floor.
11. The house and the barn were painted last week.
12. Some kids in my school like radishes.
13. All my friends went to the game.
14. The leaves on our big tree are turning red.
15. He didn't walk home.
16. Most policemen are very helpful.
17. The lost and found box is near my classroom.
18. The kindergarten teacher took it away from me.

IV. Single Word Subject

1. My favorite aunt always bakes cookies for me.
2. His new puppy has run away.
3. A large piece of pie will fill you up.
4. The first and second graders will eat late today.
5. Two of the girls have seen Star Wars.
6. Most of the parents sat together.
7. The little old lady is knitting a sweater.
8. My father's cab arrived at the airport on time.
9. John and his friends were studying dinosaurs.
10. The doctor carefully pulled the long splinter out.

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11. Toys were lying everywhere after the party.
12. Soup tastes good on a cold day.
13. A bright flash of lightning lit up the sky.
14. We may be going to Milwaukee next month.
15. The old grey barn finally collapsed.
16. Elephants can squirt people with their trunks.
17. Soap will melt away to nothing in hot water.
18. My whole family is going to Disneyland next year.
19. He could not answer all my questions.
20. People usually brush their teeth in the morning.
21. Two of my friends have been on television recently.
22. Ghosts come out after dark.
23 Bees sting people in the garden.

V. Misleading Intonation

1. My favorite aunt always bakes cookies for me.
2. His new puppy has run away.
3. A large piece of pie will fill you up.
4. The first and second graders will eat late today.
5. Two of the girls have seen Star Wars.
6. Most of the parents sat together.
7. The little old lady is knitting a sweater.
8. My father's cab arrived at the airport on time.
9. John and his friends were studying dinosaurs.
10. The doctor carefully pulled the long splinter out.

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11. Your neighbors shovel their sidewalk carefully.
12. Our dog's bark sometimes frightens people.
13. Brand new babies can't sit up by themselves.
14. A drink of cold lemonade tastes good.
15. Too much candy will make you sick.
16. The government spies on foreign agents.
17. The new teacher's watch has stopped.
18. The old clock in the hallway was ticking loudly.
19. Trainers of wild animals are brave.
20. The best season passes so quickly.
21. My brother and I were fixing it.
22. The young student guards don't carry rifles.
23. Most farmers milk their cows in the morning.

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